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Utah Lake-Jordan River Water Quality Management Planning Study

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April 1976

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SUMMARY

DRAFT ENVIRONMENTAL IMPACT STATEMENT

FOR

UTAH LAKE-JORDAN RIVER WATER QUALITY MANAGEMENT PLANNING STUDY

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VIII DENVER, COLORADO

APRIL 1976

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SPRINGFIELD, VA. 22161

SUMMARY

DRAFT ENVIRONMENTAL IMPACT STATEMENT

FOR

UTAH LAKE - JORDAN RIVER WATER QUALITY

MANAGEMENT PLANNING STUDY

UTAH LAKE - JORDAN RIVER HYDROLOGIC BASINS, UTAH

PREPARED BY:

United States Environmental Protection Agency
Region VIII
1860 Lincoln Street
Denver, Colorado 80203

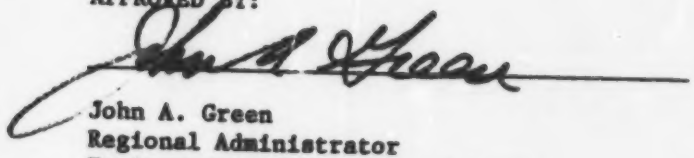
WITH TECHNICAL ASSISTANCE BY:

Nelson, Haley, Patterson and Quirk, Inc.
7409 South Alton Court
Englewood, Colorado 80110

WITH EDITORIAL ASSISTANCE BY:

Ecology Consultants, Inc.
1716 Heath Parkway
Fort Collins, Colorado 80521

APPROVED BY:



John A. Green
Regional Administrator
Environmental Protection Agency
Region VIII

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SECTION I - DESCRIPTION OF PROPOSED ACTIVITIES

In December, 1971, the Utah Division of Health, Environmental Health Services, undertook a major water quality management study of the Utah Lake-Jordan River Hydrologic Basins. A comprehensive plan for directing future water quality control activities within the Basins was subsequently developed in which many different alternative wastewater treatment schemes were evaluated to attain the water quality standards established by the State of Utah.

The plan was then submitted to the Environmental Protection Agency (EPA) for their review. If the plan is approved by the EPA, federal funds will be available to assist in the construction of the treatment facilities. The EPA has evaluated all of the alternatives presented in the plan in terms of their effect upon the environment. That evaluation is reported in full in a Draft Environmental Impact Statement. This document is a summary of that report. Both the original report and this summary are now presented for review by Federal, State, and local agencies, as well as private groups and individuals. Comments from these reviews will be considered by the EPA in reaching their decision as to which alternative, if any, will be approved.

SECTION 2 - BACKGROUND

Water quality management is an attempt to assure a safe and dependable supply of water for all types of uses through the implementation of various types of controls, treatments, and other practices. This area, which is of vital national concern, has received Federal, State, and local legislative recognition. In 1972, Congress enacted amendments to the Federal Water Pollution Control Act (Water Pollution Act), sections of which provide for comprehensive water quality management planning. Several distinct planning processes have been established by the Water Pollution Act; each of these has its own scope and purpose but depends upon the others for its ultimate effectiveness.

One basic planning process is a River Basin Plan prepared under Section 303 of the Water Quality Act. This process is primarily a state effort and establishes procedures to manage the water quality of a river basin, which is the area drained by a river and its tributaries. The concept of basin oriented water quality planning is an important one. The fluid nature of water is responsible for the creation of intimate physical, chemical, and biological linkages between the streams and impoundments of any watershed, especially with respect to downstream movement. Discharges to receiving waters at one

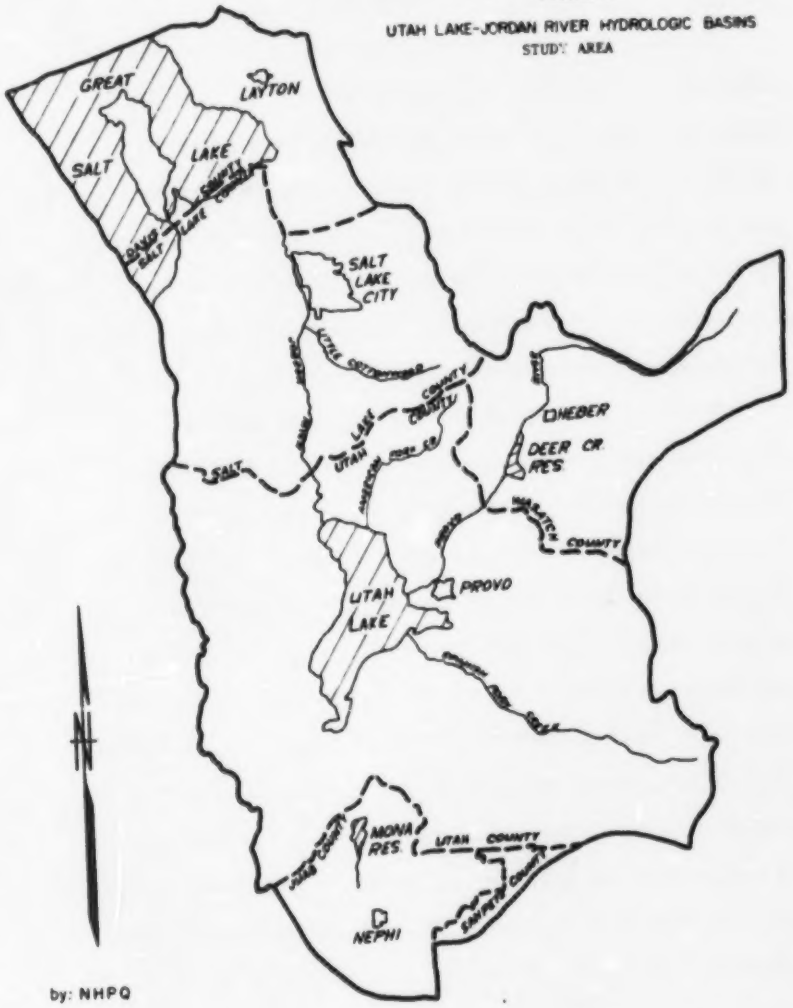
location in a watershed may thus have an effect at that location as well as in downstream areas throughout the basin.

A Facilities Plan (Section 201 of the Water Pollution Act) is a planning process that focuses upon the building of particular waste treatment facilities and compares all possible courses of action. This plan serves as a basis for a community's application for a federal grant to cover the costs of building or modifying its treatment facilities. An Areawide Waste Treatment Management Plan (Section 208) deals with areas that have serious water pollution problems. Areawide planning must consider all of the things that contribute to a comprehensive plan for managing and controlling quality.

To receive Federal funding for the construction of wastewater treatment facilities and other pol[illegible]n control projects, water planning programs, such as thos[illegible] described above, which evaluate alternative projects and their respective environmental effects must be provided to the EPA. The Utah State Division of Health (Environmental Health Services, Bureau of Water Quality), undertook a major water quality management study of the Utah Lake-Jordan River basin area, (See Figure 1). The study, designed to meet the Section 303 basin plan provisions of the Water Pollution Act (see Figure 2

FIGURE 1

UTAH LAKE-JORDAN RIVER HYDROLOGIC BASINS STUDY AREA



by: NHPQ

FIGURE 2

UTAH LAKE-JORDAN RIVER HYDROLOGIC BASINS

by: NHPQ

for drainage characteristics), was completed in 1974 and the results and evaluations of alternative wastewater treatment plans were compiled in the Report of Utah Lake-Jordan River Hydrologic Basins Water Quality Management Planning Study (hereinafter referred to as the Plan). The Plan was published in final revised form in June, 1975. The basic purpose of the study was to develop a comprehensive plan for determining the direction of future water quality control activities within the Utah Lake-Jordan River area. The major focus of the plan was to describe the physical facilities required to attain the water quality standards established by the State of Utah. A number of different wastewater treatment alternatives were evaluated in the Plan resulting in a set of actions recommended by the Utah State Division of Health. The final plan was submitted to the U.S. Environmental Protection Agency (EPA) in September, 1975 for their review.

SECTION 3 - AREA DESCRIPTION

The study area includes all or parts of Davis, Salt Lake, Utah, Wasatch, and Juab counties, and is presently served by 30 wastewater treatment plants (See Figure 3).

As the population of this area increases it is necessary to increase the capacity of water treatment facilities to meet the increased water use. The total population in the study area in 1970 was 726,488 persons. The projected population of this area in 1995 is 1,304,557 persons. Table 1 shows 1970 population and projected 1995 populations by planning areas within the study area (Figure 4 identifies the planning areas). This anticipated increase will create more of a demand for beneficial water uses than the existing treatment facilities can handle.

Approximately 2/3 of the study area is forest and woodland. This land is expected to remain pretty much the same; however, the land presently used for agriculture purposes will be affected by the population increase. Approximately 32,000 acres of this land will be converted to urban use to accommodate the additional people (see Figures 5 and 6 for existing and future land use descriptions, respectively). In 1995 approximately 60 percent of the people will be located in the North Davis area, Salt Lake City area, South Salt Lake area,

TABLE 1

EXISTING AND PROJECTED POPULATION

Planning Area	Population 1970	Population 1995	Percent Increase
North Davis Area	58,632	127,800	118%
Central Davis Area	9,518	32,500	241%
South Davis Area	45,234	80,700	78%
Magna Area	9,992	18,500	85%
Salt Lake City	174,870	242,356	39%
South Salt Lake Area	147,287	260,062	77%
Murray-Cottonwood Area	74,816	172,207	130%
Tri-Community/Sandy Area	51,642	116,882	126%
American Fork Area	53,370	100,646	89%
Heber Valley Area	5,863	9,820	68%
Lake Mountains Area	295	340	15%
Provo Area	59,826	86,415	44%
Springville Area	12,160	21,730	79%
Spanish Fork Area	9,001	14,752	64%
Payson Area	8,120	12,536	54%
Goshen/Nephi Area	5,862	7,311	25%
TOTAL	726,488	1,304,557	80%

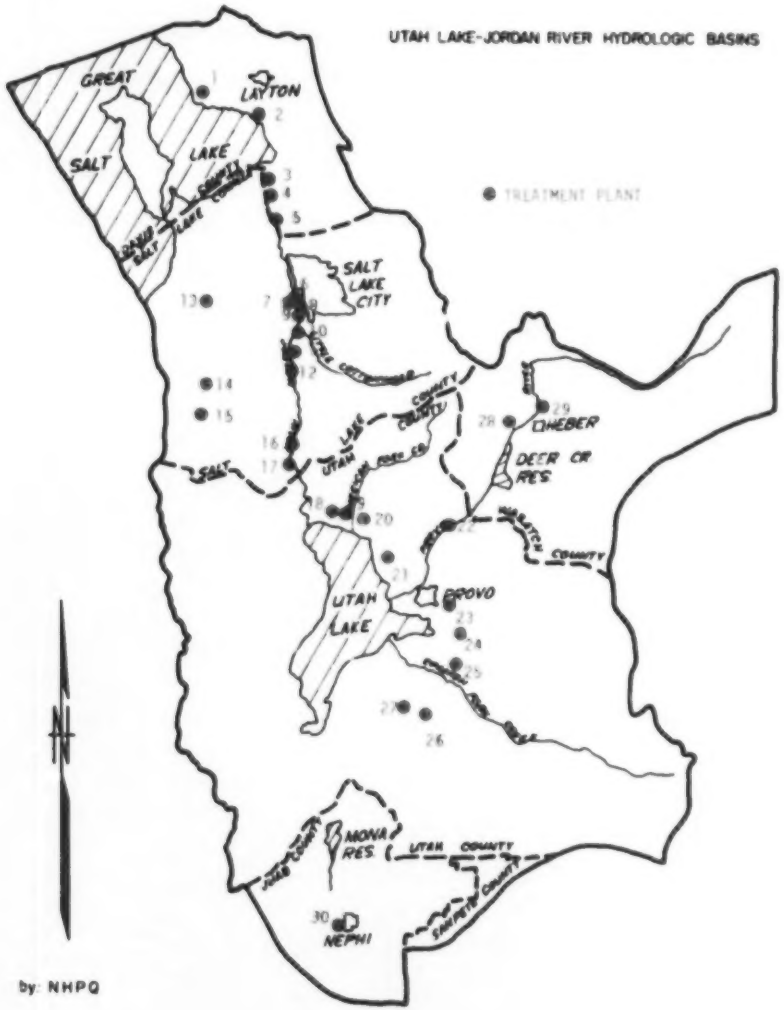


FIGURE 3

EXISTING MUNICIPAL

WASTEWATER TREATMENT

FACILITIES

LEGEND

1. North Davis
2. Central Davis
3. South Davis North
4. South Davis South
5. Salt Lake City
6. South Salt Lake City
7. Granger-Hunter
8. Salt Lake City Suburban District #1
9. Salt Lake County-Cottonwood
10. Murray
11. Tri-Community
12. Sandy
13. Magna
14. Copperton
15. Lark
16. Utah State Prison
17. Camp Williams
18. Lehi
19. American Fork
20. Pleasant Grove
21. Orem
22. Springdell
23. Provo
24. Springville
25. Spanish Fork
26. Salem
27. Payson
28. Midway
29. Heber
30. Nephi

FIGURE 4
UTAH LAKE-JORDAN RIVER HYDROLOGIC BASINS

PLANNING AREAS

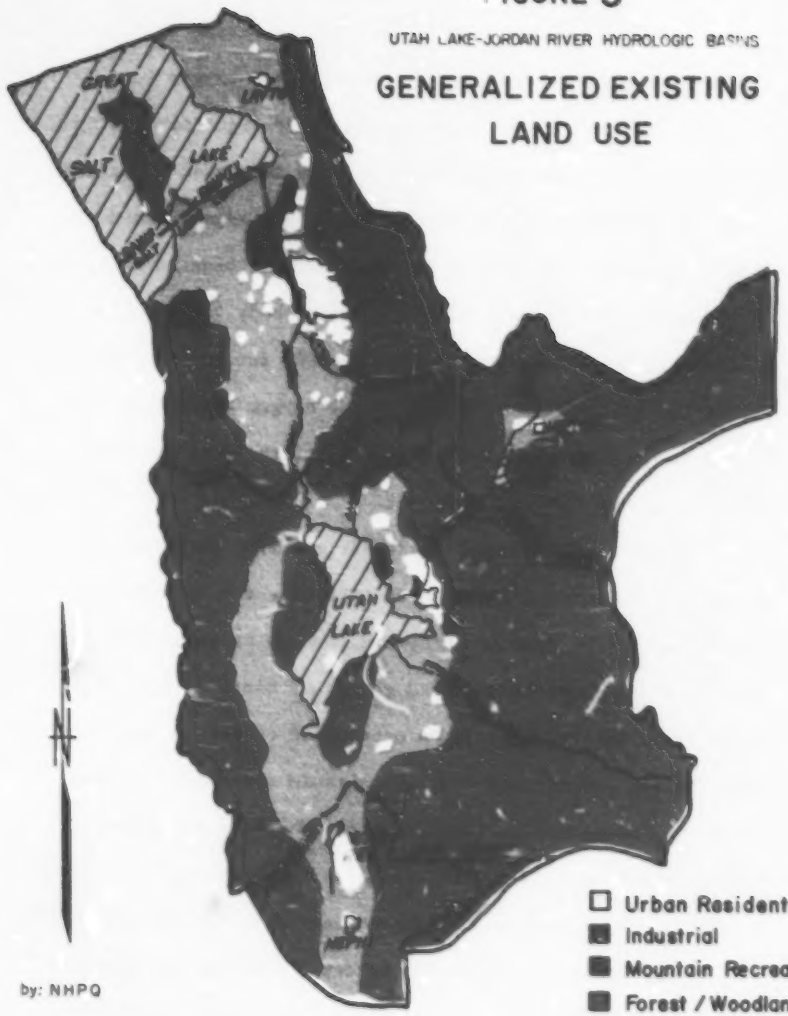
by: NHPQ

and Murray-Cottonwood area. The 1970 to 1995 population increase will least affect (less than 50 percent increase) the Salt Lake City Area, Lake Mountains area, Provo area, and Goshen/Nephi area while the North Davis area, Central Davis area, Murray-Cottonwood area and Tri-Community/Sandy area will be most affected (greater than 100 percent increase).

FIGURE 5

UTAH LAKE-JORDAN RIVER HYDROLOGIC BASINS

GENERALIZED EXISTING LAND USE



by: NHPQ

- Urban Residential
- Industrial
- Mountain Recreation
- Forest / Woodland
- Agriculture

FIGURE 6

UTAH LAKE-JORDAN RIVER HYDROLOGIC BASINS

GENERALIZED FUTURE LAND USE

by: NHPQ

- Urban Residential
- Industrial
- Mountain Recreation
- Mountain Agriculture
- Agriculture

SECTION 4 - WATER QUALITY TERMINOLOGY AND BASIC ECOLOGICAL CONCEPTS

Fundamental to the understanding of the studies performed and the evaluations of alternatives is background information regarding water quality terminology and some basic ecological principles. Certain parameters are of utmost importance in describing existing water quality and in evaluating future effects of wastewater treatment alternatives. These important parameters include Dissolved Oxygen (DO), Biochemical Oxygen Demand (BOD), coliform bacteria, nitrogen, phosphorus, and solids. Coliform bacteria are reported as number of organisms per 100 milliliter sample. All of the other parameters are reported as milligrams (1/1000 gram) per liter.

The concentration of DO can be considered one of the most significant elements in an aquatic ecosystem. The composition and productivity of the more desirable biological communities is directly related to dissolved oxygen concentration. More pollutant tolerant species predominate as DO levels decrease. As DO increases, the more desirable aquatic life forms dominate. Warm water fish can be maintained at DO levels of 4 to 5 mg/l. More cold water fish require DO in excess of 5 mg/l.

The introduction of treated discharge or effluents from wastewater treatment facilities that are operating ineffectively can result in a reduction of the dissolved oxygen in a receiving stream because bacteria and other organisms use up oxygen as they metabolize the organic and inorganic materials contained in the effluent. The biochemical oxygen demand determination is used to assess the amount of organic material in the effluent or in the receiving water body that can be utilized by bacteria. The higher the BOD, the greater the potential for pollution and subsequent oxygen depletion. The higher the level of wastewater treatment, the more BOD that will be removed from the effluent.

A variety of inorganic nutrients are also contained in wastewater effluent. A number of nutrients are required to sustain a healthy aquatic ecosystem, but in excess, these same nutrients can cause accelerated growth of certain types of organisms. This results in an unbalanced ecosystem and often leads to the proliferation of undesirable species. Nitrogen (including ammonia) and phosphorus often appear to be the limiting nutrients in aquatic systems. At high levels, these nutrients can allow algal growth to increase tremendously.

Large amounts of algae (microscopic plants) can clog water filtration systems, produce offensive odors, and impart

an undesirable taste to water used for domestic purposes. Certain species of algae in high concentrations can be toxic to livestock and man. This algal proliferation is termed a "bloom". After bloom conditions occur, the algae die and become a food source for bacteria and other microscopic organisms. In this manner the algae provide organic material like that found in wastewater treatment effluent which causes oxygen in the water to be used up as mentioned before.

The coliform group of bacteria is found in human and animal waste as well as on plants and in the soil. Fecal coliforms, associated with human and animal waste, are not considered to be disease-causing organisms; however, their presence in water in large numbers is considered to be an indicator of pollution and a public health hazard. When fecal coliform bacteria are high, the probability of the presence of disease-causing bacteria is considered also to be high.

Two types of solids are of water quality concern, Total Suspended Solids (TSS) and Total Dissolved Solids (TDS). Solids is a broad term which includes all of the organic and inorganic constituents of water. Total Suspended Solids represent the residue remaining on the filter after water is filtered. High levels of such solids impart the muddy or murky color of surface waters, may harm fish and other aquatic organisms by interfering with their breathing structures (such as gills in fish), and, depending upon the type of solids involved, can be hazardous to humans if consumed. Total Dissolved Solids, more commonly referred to as salinity or salt content, describes those chemical constituents of water which cannot be removed by filtration. Large amounts of these solids can render water unusable for irrigation and stock watering purposes. Also, high TDS can produce a laxative effect if consumed by man.

Point source pollution is, as the term implies, that pollution which can be considered as originating from a defined point. Examples include wastewater treatment plants and industrial discharges. Non-point source pollution is that pollution which is generated from large areas rather than from what can be considered a single source. Runoff from various types of land areas, such as agricultural, is the best example. Solids, nutrients, pesticides, and organic material can be washed into receiving waters from these lands in significant amounts. Non-point pollution sources and controls are one of the major concerns of the three 208 area-wide wastewater treatment management programs which are being conducted in the study area.

SECTION 5 - HEALTH EFFECTS

Wastewater treatment plants are designed to reduce BOD, solids, nutrients, and bacteria levels on the wastewater which is received from particular service areas. When the volume of wastewater to be treated increases beyond the design capacity of the plant, the efficiency of the treatment is reduced and the percent reduction of BOD, solids, nutrients, and bacteria drops. This results in poorer water quality in the receiving water body thereby increasing the potential for degradation of aquatic systems and for increased health related problems.

A multitude of chemical and biological constituents of treated domestic wastewater effluent can produce effects on public health. As previously mentioned, water with high solids concentrations can produce a laxative effect upon man. Disease-causing bacteria and viruses, which cannot be completely removed by conventional wastewater treatment, may cause many different types of diseases including influenza, dysentery, typhoid fever, chloera, gastroenteritis, tuberculosis, anthrax, brucellosis, polio, and salmonella infections. Disinfection by chlorination usually reduces significantly the numbers of these organisms reaching a receiving water body. Algae, although not considered to be directly disease-causing, can impart undesirable tastes, odors, and color to the water. Certain species of algae, especially blue-greens, can be toxic to wildlife, domestic livestock, and fish while large amounts of decaying algae can reduce dissolved oxygen levels to such an extent that aquatic organisms die. Decaying algae also may offer an excellent base upon which disease-causing organisms can grow.

Other components of treated wastewater effluent which can have detrimental effects on public health include pesticides, organic solvents, radionuclides, trace elements, and various other chemicals. Non-point and industrial point sources usually contribute most of these pollutants to receiving waters. The concentrations occurring in treated domestic wastewater effluent is usually very low, therefore, no imminent public health danger is usually present from these materials.

SECTION 6 - WATER QUALITY STANDARDS AND TREATMENT LEVELS

Various water quality standards have been developed by Federal and State entities which relate to the aforementioned important water quality parameters. Although standards and timetables for compliance may differ, all are designed to provide for the protection of aquatic ecosystems, continued beneficial use of the water, and public health. Stream standards are legal protective limits which define the quality of the water which is to be maintained. To insure that stream standards are met, effluent standards are placed upon discharge sources. Various levels of wastewater treatment can then be implemented to meet the effluent limitations and maintain the existing stream standards. Generally speaking, more stringent effluent limitations exist for small receiving streams since the dilution and assimilation capabilities of small streams are usually low compared to larger streams.

All waters within the study area have been classified as Class "C" by the Utah State Water Pollution Committee and Board of Health. A summary of the Class "C" standards is shown in Table 2 along with EPA's national ambient water quality criteria. The compliance date for attainment of these Class "C" standards as set by the State of Utah is June 30, 1983.

TABLE 2

UTAH LAKE-JORDAN RIVER APPLICABLE WATER QUALITY STANDARDS

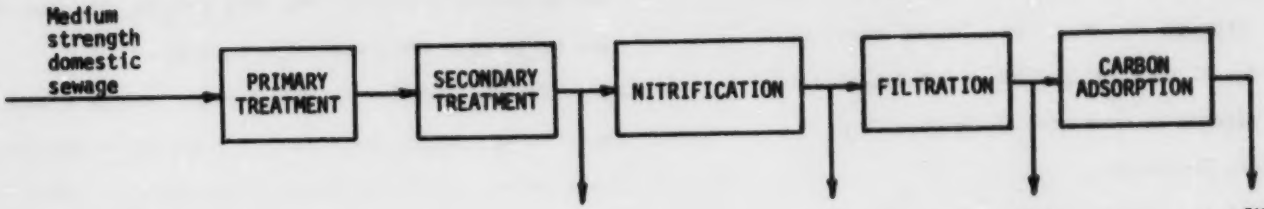
	Utah's Class "C" Standards	EPA's Water Quality Criteria
Dissolved Oxygen	5.5 mg/l (6.0 mg/l for Class "CC")	Varies according to aquatic ecosystem requirements
Total Coliforms	5000/100 ml	None
Fecal Coliforms	2000/100 ml	200/100 ml (for protection of swimmers, etc.)
Total Dissolved Solids	500 mg/l (1962 Public Health Service Drinking Water Standards)	250 mg/l (for chlorides and sulfates)
Suspended Solids	None	25 mg/l for excellent fisheries 25-80 mg/l for good to moderate fisheries 80-400 mg/l for fair to poor fisheries

In addition, Utah has adopted an anti-degradation policy requiring waters whose existing quality is better than that prescribed for their assigned classification be maintained at that high quality unless it has been demonstrated to the State that a change is justifiable as a result of necessary economic or social development and that it will not preclude present and anticipated use of the waters. A further provision is that wastes discharged to upstream waters under limitations imposed by a given classification shall be further controlled as required to protect water quality designated by all downstream classifications.

Various levels of treatment have been proposed by the State of Utah to achieve the state water quality standards. These various levels of treatment which were examined in the Plan with their expectant effluent quality are shown in Figure 7. Treatment Levels I and II are both generally considered secondary treatment with Level II providing some additional ammonia removal. Treatment Levels III and IV are generally considered advanced treatment which primarily provides additional solids and BOD removal. The following is a comparison of Utah's effluent standards with those prescribed by the EPA for secondary treatment effluent.

	Utah 1977	Utah 1980	EPA Secondary Effluent
BOD (mg/l)	25	10	30
TSS (mg/l)	25	10	30
Total Coliforms (#/100 ml)	2000	200	-
Fecal Coliforms (#/100 ml)	200	20	200

The above fecal coliform standards have been established for protecting human health since these bacteria are considered an indicator of the presence of disease-causing organisms. The EPA standard of 200/100 ml is the same as Utah's 1977 fecal coliform standard but is 10 times higher than Utah's 1980 standard. EPA is considering dropping its present standard and recognizing instead a level of disinfection which will meet applicable water quality standards. As shown in Table 2 Utah's present water quality standards for fecal coliform is 2000 organisms/100 ml. Differences in these standards are due primarily to the somewhat unknown relationship between the presence of fecal coliform and disease-causing organisms.



TREATMENT LEVEL	I	II	III	IV
SUSPENDED SOLIDS, MG/L	35	20	15	10
TURBIDITY, JTU	20	15	10	5
GREASE & OIL, MG/L	12	8	2	1
BOD_5, MG/L	25	20	10	5
COD, MG/L	100	75	50	20
NITROGEN, MG/L	30	30	30	30
PHOSPHORUS, MG/L	8	8	6	5
COLIFORM, MPN/100 ML	240	23	2.2	2.2
TOXICANTS				
SURVIVAL, %	33	40	80	90
TL_M, %	80	90	100+	100+
TOXICITY CONC., TU	1.25	1.1	0.8	0.6

FIGURE 7

TREATMENT LEVELS AND ESTIMATED EFFLUENT QUALITY

SECTION 7 - WATER QUALITY MANAGEMENT

The specific effects on water quality associated with the wastewater treatment alternatives contained in the Plan were analyzed in terms of economic consequences, waste load reductions, and effects on aquatic biology. A detailed discussion of these effects is presented in Chapter IV of the Environmental Impact Statement.

The following is an analysis by county of existing water quality, the wastewater treatment alternatives, and their effect on water quality. All costs/person/year presented in this document and in the Draft EIS are based upon 1973 costs and do not include EPA's 75 percent funding of capital expenditures. These figures also utilize a 1975-1995 median population figure.

It should be noted that the Mountainlands, Weber River, and Salt Lake County 208 Planning Studies are concentrating their efforts on non-point source evaluation and control for the area. As is pointed out in the following, there appears to be a significant pollution contribution from non-point sources. However, the estimated non-point pollution loadings which were determined for examining the total, point, and non-point pollutant contributions to the receiving waters are not based on the information being developed by these 208 agencies. Instead, the available information on loading rates from different land use categories along with existing and projected land use plans were used to estimate existing and projected, 1995, non-point loadings.

The 208 agencies are developing, through a water quality monitoring program, much more information on the nature and significance of non-point pollution sources. These 208 agencies will be evaluating the feasibility of applying controls to various non-point sources. Measures which are economically, institutionally, and environmentally acceptable for control of non-point sources will be recommended. These measures, when instituted, will reduce pollution caused by non-point sources. The degree to which these controls will be effective in achieving water quality standards is not known now, but an estimate of their cost-effectiveness should be available from the 208 agencies in approximately a year.

DAVIS COUNTY

Existing Facilities

Municipal wastewater management in Davis County is currently accomplished through four treatment plants: North Davis, Central Davis, South Davis North, and South Davis South (Figure 3).

Existing Water Quality

Headwater streams draining the west slope of the Wasatch Mountains in Davis County are of high quality. As many of these streams flow through agricultural areas and then urban development, water quality deteriorates. In the lower reaches, most streams do not meet Class C water quality standards.

Howard Slough does not meet the Class C water quality standard for Total Coliforms and Total Dissolved Solids (TDS) as well as recommended levels for nitrates (NO_3) and phosphates (PO_4). The same is true for Kays Creek which also violates the BOD standard.

BOD standards are also violated in the lower reaches of Bear Creek, Farmington Creek, Ricks Creek, Barnard Creek, Stone Creek, and Mill Creek. Of these, the water quality in Bear Creek, Farmington Creek, Stone Creek, and Mill Creek is also in violation of Total Coliform and NO_3 standards. Phosphate

standards are violated in Farmington and Stone Creeks and TDS levels are excessive in Stone and Mill Creeks.

Alternative Treatment Schemes and Water Quality Effects

Future alternative wastewater management schemes in Davis County are presented in Table 3. The last two alternatives presented in Table 3 are alternative plans recommended by the Water Quality Management Planning Study. Recommended Plan "A" includes Level III treatment at all existing treatment plants and Recommended Plan "B" includes Level III treatment at the North Davis, Central Davis, and South Davis North facilities with abandonment of the South Davis South facility and conveyance of all wastewater from its present service area to the South Davis North facility.

The alternatives which consider only Level III treatment are generally more economical than those which consider Level IV treatment or both. Estimated cost data for each of the alternatives are presented in Table IV-2 of the Environmental Impact Statement. The plan recommended by the planning study is one of the most economical of alternatives at $10.87/person/year. This plan with secondary treatment is estimated to cost $4.21/person/year.

The Davis County wastewater treatment plant effluents ultimately end up in Farmington Bay and the Great Salt Lake.

TABLE 3

DAVIS COUNTY
WASTEWATER MANAGEMENT ALTERNATIVES

Alternatives	North Davis	Central Davis	South Davis North	South Davis South
DC-1	IV	IV	IV	IV
DC-2	III	III	III	III
DC-3	III ■	III ■	IV	IV
DC-4	III ■	III ■	III	III
DC-5	III ■	A	IV	IV
DC-6	III	A	III	III
DC-7	III ■	III ■	IV	C
DC-8	III ■	III ■	III	C
DC-9	III ■	III ■	B	B
DC-10	III ■	III ■	IV	D(IV)
DC-11	III ■	III ■	III	D(III)
DC-12	III ■	III ■	D(IV)	D(IV)
DC-13	III ■	III ■	D(III)	D(III)
Recommended Plan A	III	III	III	III
Recommended Plan B	III	III	III	C

LEGEND

Connect to: A - North Davis
B - Central Davis
C - South Davis North
D - Salt Lake City

Discharge to: ■ - Great Salt Lake

The high salt content drastically limits the aquatic life in the Great Salt Lake; however, natural wave action has created a sand barrier effectively separating Farmington Bay from the remainder of the Great Salt Lake. As fresh water enters the Bay the salinity of the Bay is being gradually reduced. The southern end of the Bay has now become a substantial recreation source (hunting and fishing) but also acts through its marshes as a nutrient sink in removing organics, nutrients, and TSS from the Jordan River as it flows into the Bay. The continual discharge of wastewater and extensive use of the marshes will stress the fragile ecosystem balance of the Bay in its unique and intriguing situation with respect to the rest of the Great Salt Lake. It is difficult to evaluate the effect of wastewater discharge in the Bay because of the limited information currently available on this ecosystem. This issue is currently being studied in the Weber River Water Quality Planning Council's 208 Program.

SALT LAKE COUNTY

For the purpose of this report, wastewater management in Salt Lake County was divided into two areas. Wastewater in the Magna Area is treated at the Magna facility and is discharged to Kersey Creek and thus to Great Salt Lake. Municipal wastewater in the remainder of Salt Lake County is currently treated at the Salt Lake City, Sandy, Tri-Community, Murray, Cottonwood, Granger-Hunter, Salt Lake City Suburban Sanitation District No. 1, and South Salt Lake City facilities. Effluent from the Salt Lake City Treatment Plant is discharged to the Salt Lake City Sewage Canal which flows to Great Salt Lake. Effluent from the remaining facilities is discharged along a 14 mile reach of the Jordan River between 94th and 21st Streets South.

Existing Water Quality

Water quality problems in Salt Lake County are similar to those in Davis County. Streams originating in the Wasatch Mountains manifest high water quality in the headwater reaches but deteriorate in quality as they flow through rural and urban areas.

Except for the lower part of the Jordan River, all Salt Lake County streams meet or exceed the Class CC DO standard of 6.0 mg/l. All of the Jordan River in Salt Lake County and the

Surplus Canal violate all Class C standards (except DO, which is violated only in the Salt Lake City Area) as well as the recommended values for NO_3 and PO_4. The same is true for the lower reaches of Big Cottonwood Creek and Butterfield Creek.

Emigration Creek also manifests water quality problems. Emigration Creek, above the confluence with Red Butte and Parleys Creek, is in violation of the BOD, Total Coliform, NO_3, and TDS standards. NO_3 and TDS levels are also excessive below the confluence. Red Butte Creek and Parleys Creek violate NO_3 levels and Parleys Creek also violates Total Coliform standards.

Little Cottonwood Creek and Midas Creek are in violation of the Total Coliform standard for Class C waters as well as the recommended values for NO_3 and PO_4. Mill Creek and City Creek manifest the identical problem and also have excessive TDS levels.

Alternative Treatment Schemes and Water Quality Effects (Salt Lake County)

Future alternative management schemes for the area are presented in Table 4. The wastewater treatment alternative recommended in the Plan involves the abandonment of all existing facilities except the Suburban Sanitation District No. 1 facility and the Salt Lake City plant. Wastewater from all abandoned facilities would be treated at the Suburban Sanitation District No. 1 plant. This alternative would cost $8.78/person/year and is the least expensive alternative. With secondary treatment instead of Level III this alternative would cost $4.83/person/year. Because of the long interceptors required, conveyance of all water to one central facility, such as specified in Alternatives SLC-7, SLC-8, and SLC-11, is not more economical.

A large amount of the BOD, TDS, TN, and TSS waste loadings come from non-point sources. Future non-point source loadings do not vary among the alternatives because all alternatives are based on the same land use plan.

BOD and Phosphate point loadings vary among future alternatives. Level IV treatment alternatives would result in 48 percent less point source BOD loading and 15 percent less PO_4 loading than the Level III treatment alternatives.

TDS and TN are unaffected by Level III and Level IV treatment processes and TSS contributions from point sources are minimal (less than one percent of total waste loadings). Coliform bacteria loadings from point sources can be expected to decrease under all future alternatives because of the effluent limitations on coliform bacteria for all treatment levels.

TABLE 4

SALT LAKE COUNTY
WASTEWATER MANAGEMENT ALTERNATIVES

Alternatives	Sandy City	Tri-Community	Murray City	Salt Lake County-Cottonwood	Granger-Hunter	Salt Lake City SSD #1	South Salt Lake City	Salt Lake City
SLC-1	IV	IV	IV	IV	IV	IV	IV	IV
SLC-2	III	III	III	III	III	III	III	III
SLC-3	E	IV	F	IV	G	IV	G	IV
SLC-4	E	III	F	III	G	III	G	III
SLC-5	E	IV	G	G	G	IV	G	IV
SLC-6	G	G	G	G	G	IV	G	IV
SLC-7	H	H	H	H	H	H	H	IV
SLC-8	H	H	H	H	H	H	H	III ■
SLC-9	E	III	G	G	G	III	G	III
SLC-10	G	G	G	G	G	III	G	III
SLC-11	H	H	H	H	H	H	H	III
SLC-12	G	G	G	G	G	III	G	III ■
Recommended Plan	G	G	G	G	G	III	G	III

LEGEND

Connect to: E - Tri-Community
F - Cottonwood
G - Salt Lake City SSD-1
H - Salt Lake City

Discharge to: ■ - Great Salt Lake

The DO measurement in the Jordan River under all treatment alternatives violates the State's Class CC standard. Even without any point source BOD discharges this standard would be violated with the current non-point source loadings. Controls instituted on non-point sources as a result of the ongoing 208 programs could alter this situation in the future.

The existing water quality and bottom substrate conditions are poor for a healthy aquatic habitat in the Jordan River. Without control of non-point pollution sources, implementation of secondary, Level III, and Level IV treatment alternatives is not likely to improve these conditions. Conveying all wastewater to the Salt Lake City facility with discharge to Great Salt Lake via the Sewage Canal improves the water quality to some degree, but still not enough to support a cold water fishery. Reducing Phosphate waste loads will likely have no effect in the aquatic ecosystem because the Jordan River is nitrogen deficient indicating increased nitrogen loadings will be more of a problem. Because of the situation, however, future increases in Total Nitrogen waste loads may cause nuisance aquatic growth and associated adverse effects. Additionally, the unknown future status of Farmington Bay created by the natural diking makes it difficult to predict the effect of discharging wastewater effluent of secondary, Level III, or Level IV quality from the Salt Lake City facility via the Sewage Canal to Great Salt Lake. This issue is currently under study by the Weber River and Salt Lake County 208 programs.

Alternative Treatment Schemes and Water Quality Effects (Magna Area)

The Magna Area comprises that portion of Salt Lake County which drains directly into Great Salt Lake. One community (Magna), the single largest industrial complex in the Study Area (Kennecott Copper), a chemical plant, and several salt and mineral recovery operations are essentially all of man's development in the Magna Area. Because of this limited urban development, no detailed discussion is present in the Plan on alternative wastewater treatment schemes for the area. A recommendation is made by the Plan that Magna implement Level III treatment. An attempt was made to broaden the analysis by comparing the benefits of the recommended alternative (Level III treatment) to Level IV and to secondary treatment.

The alternative recommended by the Plan at Level III is more economical, $24.22/person/year, than the Level IV treatment alternative, $38.28/person/year. However, the

cost of the recommended plan could be reduced to $13.28/person/year if secondary treatment was permitted instead of Level III.

Because of the minimal development anticipated for the Magna area, future non-point loads are not expected to change significantly from existing conditions. Future point source pollutant loads for all parameters considered except Total Suspended Solids are expected to decrease markedly under any alternative treatment scheme. The fact that any alternative results in almost the identical reduction reflects the significant contribution from industry to the area's point source loading. Future industrial wastewater effluents were assumed to meet EPA effluent requirements and because these sources comprise such a large part of total point source loadings to the area, the various levels of proposed treatment at Magna have little effect on the total point source waste load.

It seems reasonable to conclude that advanced wastewater treatment alternatives are not likely to alter future aquatic effects because of the extremely large contributions of industrial waste loads. Localized aquatic effect to Kersey Creek may be improved with advanced treatment, but because this Creek is essentially a drainage canal for surrounding tailing ponds, it is questionable if advanced treatment would significantly improve the aquatic ecosystem.

NORTHERN UTAH COUNTY

Existing Facilities

Northern Utah County is defined as the area served by the Lehi, American Fork, Pleasant Grove, and Orem treatment plants. All these facilities except Orem discharge to ditches or streams leading to Utah Lake. Orem discharges directly to Utah Lake. The Plan assumed that presently unsewered areas such as Alpine, Manila, and Lindon will be sewered and connected to an existing system during the next twenty years (See Figure 3).

Existing Water Quality

Significant water quality problems in Northern Utah County surface streams are apparent in the Jordan River and American Fork River. The American Fork River violates all Class C standards. The Jordan River manifests excessive concentrations of BOD, NO_3, PO_4, and TDS. The discussion of water quality problems in Utah Lake is presented in the section on Central Utah County.

Alternative Treatment Schemes and Water Quality Effects

Future alternative municipal wastewater management schemes for the area are presented in Table 5. The State of Utah recommended alternative includes the abandonment of the Lehi

and Pleasant Grove facilities with wastewater conveyance to American Fork and expansion and upgrading of the American Fork and Orem facilities to Level III. Lehi, Pleasant Grove, and American Fork facilities currently comprise the basis of the Timpanogos Planning Association's effort. A new regional plant is anticipated.

The alternative recommended in the Plan is one of the least costly at $18.02/person/year. If secondary treatment were permitted this cost would be reduced to $9.92/person/year.

Non-point sources account for a significant portion of BOD, TSS, and TDS waste loads. Future BOD and TSS non-point source loadings do not vary significantly from existing conditions, but future TDS non-point source loadings do decrease approximately 25 percent. NO_3 and PO_4 contributions from non-point sources are less than seven percent and 20 percent, respectively, of existing or any alternative future condition.

TDS is unaffected by treatment levels, thus all alternatives result in identical TDS loadings. Effluent NO_3 concentrations are not affected by going from Level III to Level IV treatment. BOD and PO_4 do vary with treatment level but utilizing Level III treatment will not decrease the BOD waste

TABLE 5

NORTHERN UTAH COUNTY
WASTEWATER MANAGEMENT ALTERNATIVES

Alternatives	Lehi	American Fork	Pleasant Grove	Orem
NUC-1	IV	IV	IV	IV
NUC-2	III	III	III	III
NUC-3	III △	III △	III △	III △
NUC-4	IV	III △	IV	IV
NUC-5	J(IV)	J(IV)	J(IV)	IV
NUC-6	J(III)	J(III)	I(III)	III
NUC-7	J(III) △	J(III) △	J(III) △	III △
NUC-8	K	K	K	III △
NUC-9	K	K	K	IV
NUC-10	L(III) △	L(III) △	L(III) △	L(III) △
NUC-11	L(IV) ◊	L(IV) ◊	L(IV) ◊	L(IV) ◊
NUC-12	L(III) ◊	L(III) ◊	L(III) ◊	L(III) ◊
Recommended Plan	M	III	M	III

LEGEND

Connect to: J - New American Fork
K - Orem
L - New Provo
M - American Fork

Discharge to: △ - Utah Lake
◊ - Provo Bay

load because of population growth and increased use of the water. A significant decrease would occur, however, if Level IV is implemented. For the same reason (population growth) the PO_4 waste load is decreased only slightly if Level IV, rather than Level III, treatment is achieved. Both BOD and PO_4 waste loads would increase over the existing conditions if only secondary treatment were utilized. Coliform bacteria loadings from point sources can be expected to decrease under any alternative because of effluent limitations on such bacteria for secondary, Level III, and Level IV treatment.

The aquatic effects associated with wastewater treatment alternatives in Northern Utah County are related to Utah Lake because treatment plants and industrial sources discharge close to or directly to the Lake. Based on this and because the total BOD waste loading is only slightly reduced for Level III and Level IV alternatives, no significant increase in the DO of Utah Lake should result. For alternatives containing recommendations for regionalization, increased discharges may impose some localized DO reductions; however, the mean DO concentration in Utah Lake in the Northern Utah County area ranges well above the Utah State Standard of 5.5 mg/l for warm water fisheries. Utah Lake is currently a nitrogen-deficient system; consequently, minor reductions or increase in phosphates waste loads should have little effect on the ecosystem. However, significant increases in nitrogen loadings may cause algal blooms depending upon other limiting factors including sunlight penetration of this relatively murky water body.

CENTRAL UTAH COUNTY

Existing Facilities

Central Utah County is defined as that area served by the Provo, Springville, Spanish Fork, Payson, and Salem treatment plants. In developing wastewater management alternatives, it was assumed that unsewered areas such as Mapleton and Salem Hills will be sewered and connected to existing system during the planning period (See Figure 3).

Existing Water Quality

Significant water quality problems in Central Utah County surface streams are apparent in Beer Creek, Provo River, Hobble Creek, and the Spanish Fork River. Beer Creek violates all Class C standards. The Provo River is high in all parameters except Total Dissolved Solids. Hobble Creek and Spanish Fork exhibit significant levels of all constituents except BOD.

Utah Lake is the final receiving water for all surface streams in the County except the Jordan River which is the major drainage for Utah Lake. Except for high PO_4 and TDS levels, the main Lake body is within the standards established for it (Class CW). The same is not true of the principal bays and areas around the polluted tributaries. Water in Provo Bay does not mix well with the remainder of Utah Lake. As a result of this and tributary drainage, sections of Provo Bay do not meet Class CW standards. In the eastern end of Provo Bay DO levels are slightly deficient while NO_3 and PO_4 levels are high. However, DO, levels are higher in much of the remaining portion of the Bay than in the rest of Utah Lake. Also in contrast to the remainder of the Lake, all of Provo Bay exhibits low TDS concentrations. Goshen Bay has lower BOD levels than found in Provo Bay and in much of the main water body of the Lake. Because of the lack of significant tributary flow and underlying salt flats, Goshen Bay has extremely high TDS concentrations.

Alternative Treatment Schemes and Water Quality Effects

Alternative future wastewater management alternatives for Central Utah County are presented in Table 6. The State of Utah recommended alternative includes the abandonment of the Springville and Spanish Fork facilities with wastewater conveyance to Provo and the expansion and upgrading of the Provo facility to Level III. Salem is to maintain a Level II facility with a discharge to Payson for Level III treatment.

The costs and capacity associated with the ongoing program for upgrading and expanding the Provo treatment facility to Level III treatment are utilized in the economic analysis and consequently secondary treatment was not analyzed. This

TABLE 6

CENTRAL UTAH COUNTY
WASTEWATER MANAGEMENT ALTERNATIVES

Alternatives	Provo	Spring-ville	Spanish Fork	Salem	Payson
CUC-1	IV	IV	IV	IV	IV
CUC-2	III	III	III	III	III
CUC-3	IV	IV	IV	N	IV
CUC-4	III	III	III	N	III
CUC-5	IV	P	P	IV	IV
CUC-6	III	P	P	III	III
CUC-7	III △	P	P	III	III
CUC-8	III △	P	IV	IV	IV
CUC-9	III △	P	III	III	III
CUC-10	III △	P	P	P	P
CUC-11	IV ◇	P	P	P	P
CUC-12	III ◇	P	P	P	P
Recommended Plan	III	P	P	II ✡	III

LEGEND

Connect to: N - Payson
P - Provo

Discharge to: △ - Utah Lake
◇ - Provo Bay
✡ - Payson Plant

upgrading and expansion includes additional capacity to accommodate the alternative recommended by the Plan.

Future non-point sources comprise approximately 90 percent of the total BOD waste load in Central Utah County; therefore, any change in municipal wastewater loadings results in only a small change in the overall BOD waste load in the area. Although TSS waste loads are significantly different at different levels of treatment, non-point sources account for over 99 percent of the total waste load and, therefore, overshadow any TSS reduction attributable to advanced treatment processes. Similarly, almost half of the total PO_4 waste load is attributable to non-point sources which greatly reduces the overall effect of advanced wastewater treatment. Thus, because of the effec. of current plans to implement Level III treatment at Provo, significant non-point contributions, and industrial sources, the total future waste loads do not significantly change with any alternative. Moreover, total future waste loads either do not change significantly or increase when compared to existing conditions. This situation indicates the need for non-point source controls as being studied by the 208 Programs.

None of the alternatives reduce BOD waste loads to the extent which would improve the aquatic ecosystem of Utah Lake.

Some alternatives (CUC-7, CUC-8, CUC-9, and CUC-10) will discharge to Utah Lake and will increase the potential for nuisance aquatic growth. Changes in water quality due to a Lake outfall could affect spawning areas at the mouth of Provo Bay.

WASATCH COUNTY

Existing Facilities

Heber City and Midway are the only communities in Wasatch County currently operating wastewater collection and treatment facilities (See Figure 3).

Existing Water Quality

Although water quality problems are limited in Wasatch County, the use of surface waters for water supply magnify the concern for the quality of these waters. The most significant problem seems to be excessive nutrient levels in streams entering Deer Creek Reservoir, such as Spring Creek, Daniels Creek, Center Creek, Lake Creek, and Snake Creek as well as the upper Provo River and its tributaries. These inputs also serve to increase NO_3 and PO_4 levels below Deer Creek Reservoir. Decker Creek and Spring Creek also have Total Coliform amounts in excess of Class C water.

Alternative Treatment Schemes

Heber's collection system suffers massive infiltration and all future alternatives assume correction of this problem. Alternative future wastewater management systems for Wasatch County are presented in Table 7. The alternative recommended in the Plan includes Level II treatment facilities

TABLE 7

WASATCH COUNTY
WASTEWATER MANAGEMENT ALTERNATIVES

Alternatives	Heber	Midway
WC-1	IV	IV
WC-2	III ●	III
WC-3	Q	III ●
WC-4	R	II ◪
WC-5	R	IV ●
WC-6	P	P
Recommended Plan	II ★	II ★

LEGEND

Connect to: P - Provo
Q - New Charleston
R - New South of Heber

Discharge to: ◪ - Percolation
★ - Effluent to New Charleston (III)
● - Provo River

at both Heber and Midway with effluents discharged to a new regional facility at Charleston for Level III treatment.

The alternative recommended in the Plan is one of the least expensive at $30.30/person/year. If only secondary treatment were required this cost would be reduced by 2/3 because the cost of interceptor lines and advanced treatment equipment at Charleston would be eliminated.

Non-point sources currently contribute between 56 and 98 percent of the total waste load for those parameters considered. Because future development is limited, the future non-point sources pollution is expected to be almost identical to existing conditions. In terms of total waste loadings, future BOD, TN, and PO_4 loads will be less than existing conditions. However, the impact of advanced waste treatment on these reductions can be misleading. Actually, future waste loads were estimated by assuming the massive infiltration/inflow problem in the Heber Valley would be resolved. Thus, even with more people, future waste flows are less than existing. It should also be noted that although future total area waste loads are less than existing loadings, the location of discharges can have a significant impact on the surface waters used for water supplies. All alternatives except WC-6 require discharges in or above Deer Creek Reservoir. Because

the Reservoir is a source of raw water for Provo, these alternatives may have a detrimental effect on that use.

The aquatic effects of the alternative wastewater treatment schemes are extremely difficult to assess for Wasatch County because of the almost total lack of water quality data in this area. From what little information is available, it can be concluded that discharge of Heber effluent to the Provo River may enhance the aquatic habitat of Spring Creek, but at the expense of the Provo River. Additionally, the closer the discharge of wastewaters to Deer Creek Reservoir, the higher the potential for nutrient enrichment of the Reservoir.

Alternative WC-4 contains a recommendation for secondary treatment and land disposal. The groundwater table in Wasatch County is extremely high and waste loads imposed on the land for assimilation may adversely affect the quality of the groundwater.

SECTION 8 - EFFECTS ON THE TERRESTRIAL ECOSYSTEM

Expansion of existing treatment facilities would affect a small area surrounding each facility. Most effects would be short-term and would persist only through the construction phase. Generation of sediment loads, noise, and particulate matter are typical construction related problems. In most cases, the area surrounding the plant has already made adjustments to those stresses and the effects of minor plant modifications would be minimal.

Consolidation of facilities with associate interceptor construction and expansion of a few regional treatment plans would also affect the terrestrial ecosystems. The size of the area to be consolidated, the length of the required connecting interceptors, and the type of habitat to be crossed all influence the severity of this effect. Interceptor corridors could cause the loss of natural intolerant vegetation communities and the introduction of more tolerant weedy vegetation, while regional plant facilities would require more land for expansion.

If <u>new</u> regional facilities are proposed, the problems discussed above would still exist in addition to removing natural habitat.

Growth-related problems (indirect effects) generally occur in the absence of land use controls to minimize such problems.

Without such controls, additional treatment plant capacity and major interceptors may induce scattered or sprawl development, thereby disrupting terrestrial ecosystem habitat.

A majority of the land between urban centers is within the grass-sagebrush ecosystem but is being utilized for agriculture and has created large acreages of unique habitat types. Grain fields provide food and cover for particular upland game species and small mammals. Orchards provide food, cover, and nesting areas for several forms of "aesthetic" wildlife (i.e., song birds, game birds, etc.). While urban development of agricultural lands will not necessarily result in elimination or disruption of particularly unique vegetation associations, the elimination of tilled acreage and a commitment of it to urban development will place increased stress on the wildlife that is dependent upon the man-created habitat.

Increased growth could also cause disruption of historical or archaeological sites. Land use management plans could be used to assist in the preservation of known sites.

SECTION 9 - LAND USE

Implementation of any of the wastewater treatment alternatives will have an effect on land use patterns. These effects can be classified as direct or indirect. Direct effects are assessed in terms of the effect that expanding existing facilities will have on present and future land uses in the immediate surrounding area. Indirect effects are evaluated by determining the influence an alternative would have on existing land use policies. An example of a direct effect might be the destruction of a wetland from construction of an interceptor, whereas the destruction of a wetland from induced growth caused by construction of an interceptor is is an indirect effect. Land use consequences are discussed further in Chapter V of the Environmental Impact Statement.

DAVIS COUNTY

Alternatives DC-5 through DC-9 (Table 3) and the alternative recommended by the Plan have the greatest potential effects on land use, particularly indirect effects. All of these alternatives require interceptors across agricultural land. This could encourage urban development of the areas. All other alternatives appear to have only minor potential for effecting adjacent land or influencing land use patterns.

SALT LAKE COUNTY

Most of Salt Lake County is developed land, either agricultural or urban. Residential areas exist within 1/2 mile of the treatment facilities at Cottonwood, Tri-Community, Sandy, Granger-Hunter, and Murray. Expansion of these facilities would have an adverse direct effect on the adjacent areas as the physical facilities will require more land area. Alternatives SLC-7, SLC-8, and SLC-11 recommend abandoning these facilities and treating the water at the Salt Lake City plant. The interceptors transporting this water would cross urban areas and would have little effect on adjacent land use. The Salt Lake City plant is the furthest removed from residential areas (3/4 mile).

Alternatives SLC-6, SLC-10, and SLC-12 also involve the consolidation of treatment facilities. Under these plans, the Salt Lake Suburban No. 1 plant would be used for wastewater treatment and other facilities would be abandoned. There is some residential area 1/2 mile from the plant, as well as some industrial development 1 mile from the plant which could be directly affected by plant expansion. In addition, uranium tailings presently located at the treatment facility could cause problems in that there is a possibility that harmful radioactive particles could be conveyed to the groundwater, Jordan River, or wastewater effluent. If the facility is made a regional treatment plant (as in the alternatives above), additional land would have to be purchased unless the uranium tailings are moved. The Energy Research and Development Administration is presently funding a study to determine the effects associated with the tailings, and if needed, the best method of removing and disposing of them.

NORTHERN UTAH COUNTY

The Utah County Comprehensive Plan endorses the maintenance of agricultural land and green belts between existing communities. Without proper enforcement of land use controls, many of the wastewater treatment alternatives could potentially undermine these goals.

Alternatives NUC-5 through NUC-12 all propose the construction of interceptor lines across land which is currently agricultural. The alternative recommended by the Plan proposes continued use of the Orem facility and abandonment of the Nehi and Pleasant Grove plants. Wastewater from these abandoned plants would be transported by interceptors across agricultural land to the American Fork plant for treatment.

Alternatives NUC-1 through NUC-4 propose no new facilities or interceptors and would require only the upgrading of existing facilities. These alternatives best serve the local

land use plans in that they would have a minimal effect on the surrounding agricultural land. Alternatives NUC-8 and NUC-9 have the least effect on adjacent land use as many of the plants would be abandoned thereby concentrating potential effect in a minimum number of locations.

CENTRAL UTAH COUNTY

Alternatives CUC-3 through CUC-12 and the alternative recommended by the Plan all propose interceptors through areas that are currently agricultural. Alternatives CUC-1 and CUC-2 do not require interceptors and consequently best serve the local land use policy in the area.

Alternatives CUC-10 through CUC-12 would consolidate all treatment at the Provo plant and have the least effect on adjacent land use as many of the plants would be abandoned thereby concentrating potential effects in a minimum number of locations.

WASATCH COUNTY

The two existing treatment facilities (at Heber City and Midway) have residential development with 1/2 mile of the plant site. Alternatives WC-1 and WC-2 propose expansion and upgrading of these facilities which could directly affect adjacent land use. Alternatives WC-3, WC-4, and WC-5 consider a new regional facility at Heber Valley. Varying discharge schemes and treatment levels distinguish these alternatives (See Table 7). Alternative WC-6 suggests abandoning both facilities and connecting to the Provo facilities. The long interceptor line required by this plan would pass through Provo Canyon which is presently undeveloped. This would effect local land use in this area over the long term. Residential and, to a lesser extent, commercial development would be facilitated While this alternative would mitigate adjacent land use problems at Heber and Midway facilities, it would cause urbanization and commercialization of one of the most unique and naturally pristine areas remaining in the region.

The alternative recommended by the Plan would provide Level II treatment at Heber City and Midway. Effluents from both plants would be conveyed to a new plant at Charleston for Level III treatment. New plant construction would naturally affect adjacent land use.

FLOOD HAZARDS

Two facilities within the study area, Tri-Community and Murray, are in defined flood plains. Expansion and continued use of these facilities may create a problem during floods. Pollution from bypassing raw or improperly treated

sewage could occur. As equipment damage or plant shut downs could also occur during floods, use and expansion of these facilities might require additional costs for flood protection.

The Tri-Community facility, which would be a regional wastewater treatment plant if alternative SLC-3, SLC-4, or SLC-5 is implemented, has some protection from a clay dike but this is insufficient for a major flood. The Murray facility would be maintained in alternatives SLC-1 and SLC-2. The worst flood occurring over a typical 250 year period would cause damage to the plant. The worst flood over a typical 100 year period would cause damage only if debris at the 4500 Street South bridge causes an obstruction to flood flow. However, both of these facilities would be abandoned under the Salt Lake County alternative recommended by the Plan.

SECTION 10 - AIR QUALITY

Based on topographical and meteorological features as well as the locations of emission sources, the study area can be divided into two reasonably distinct air basins, the Salt Lake City basin, and the Provo basin with the Traverse Mountains (Salt Lake County-Utah County line) as the common boundary.

A variety of air pollutants were investigated to determine present air quality and to predict, by use of a detailed model, future air quality (see Chapter VI of the Draft EIS for detailed information). Two pollutants which are closely related to urban activity and growth, and which have recognized health effect are carbon monoxide (CO) and total suspended particulates (TSP). CO is a poisonous inhalent that is dangerous because it interferes with the normal transport of oxygen throughout the human body. Large amounts of TSP are also a health hazard to humans and wildlife. They not only cause respiratory problems, but increase respiratory problems associated with sulfur dioxide pollution from other sources. High TSP reduces visibility and corrodes many materials. The EPA developed primary and secondary standards for CO and TSP are presented in Table 8.

Sources of CO and TSP can usually be classified as point,

TABLE 8

EPA AIR QUALITY STANDARDS FOR CO AND TSP

Pollutant	Time (hrs)	Primary Standard ug/m³	Primary Standard ppm	Secondary Standard ug/m³	Secondary Standard ppm
CO	1*	40,000	35	40,000	35
	8*	10,000	9	10,000	9
TSP	24*	260	--	150	--
	1 year	75	--	60	--

* Values not to be exceeded more than once per year.

line, or area sources. Point sources are large single stack emitters such as power plants and steel mills. Major roads are line sources because of the emissions from individual vehicles travelling along the roads. Area sources are the total of many emitters not placed in the point or line classifications. Area sources include residential area space heating and traffic on minor roads.

Present Air Quality

Historically several communities in the study area have experienced particulate concentrations at or above the level which can cause adverse health effects. There are an estimated 10,000 line sources in the area which account for 26 percent of the TSP emissions from exhaust, tire wear, dust from unpaved roads, and highway construction. Point sources contribute 48 percent of the TSP in the area with industrial developments being the primary polluters. Area sources, mostly residential development, contribute 26 percent of the TSP in the area.

Annual average data from a Salt Lake City monitor indicates that TSP levels in the City are generally in excess of the annual primary standard of 75 micrograms per cubic meter. Data from the Kearns and Magna area indicate that the annual

standard is not being exceeded there. Salt Lake City, Salt Lake City Airport, and Magna all exhibit TSP concentrations above the 24-hour maximum average standard of 260 micrograms per cubic meter.

Due to the relatively short record (1972-1974), insufficient information exists to establish trends in TSP levels in the Provo Basin. While annual average concentrations are below the primary standard at all stations except the city of Provo, 24-hour maximum concentrations above the primary standard have been recorded at all sites.

The data for CO levels in the Salt Lake City Basin is sparse. Available information shows that the 8-hour standard has been continuously exceeded while the 1-hour concentration has been generally at or just below the 1-hour standard. Transportation line sources contribute 92 percent of the CO emissions in this air basin.

Existing data shows that CO concentrations in the Provo Basin are increasing and that 8-hour standards are exceeded and 1-hour standards are generally not exceeded. Point sources account for 15 percent of the CO concentrations in this basin while 80 percent is contributed by automotive sources and only 5 percent is produced by area sources.

The Utah State Implementation Plan (SIP) stipulates a variety of strategies (control of auto emissions, reductions in driving, improved traffic control, and increased use of public transportation) to achieve reductions in concentrations of CO. This control strategy calls for significant reduction in CO levels in both the Salt Lake City area and Provo area.

Effects

Construction or expansion of wastewater treatment facilities and interceptor lines can affect air quality directly through increases in dust and engine emissions during construction. Although these direct effects are usually of a limited nature and of short duration, they nevertheless require that specific guidelines be followed to minimize the degree of air quality degradation.

The major air quality effects related to wastewater treatment facility development are usually indirect ones. Expansion or creation of wastewater treatment facilities can encourage and accommodate residential, commerical, and industrial development. This increases motor traffic, point source emissions, and potential for urban sprawl, and dust problems related to land disturbance.

A prediction of future pollutant levels is made by assessing the effects of the land use plan associated with

wastewater treatment alternatives. More detailed discussions are given in the Draft EIS, Chapter VI.

SALT LAKE CITY BASIN

Concentrations of CO are predicted to improve markedly by 1995 because of assumed auto emission controls. As one moves toward 1995, there may still be violations of CO standards until all emission controls are implemented. Estimates of 1985 CO concentrations indicate some violation of the 8-hour CO standard in western Salt Lake City under "worst case" conditions (explained in the Draft EIS), however, by 1995 the CO concentrations are projected to be well below the standards.

Concentrations of TSP in the basin, under "worst case" conditions, now violate both 24-hour average and annual average standards in western Salt Lake City. This condition is expected to continue with some outward movement of highest TSP concentrations toward the suburbs. Cont ued control of significant point sources of particulates will reduce the predicted concentrations.

PROVO BASIN

It is estimated that CO levels will meet primary standards by 1985 and will be considerably below national ambient standards by 1995, primarily the result of auto emission controls. The highest existing CO concentrations occur over southern Provo where the 8-hour standard is currently being violated. The 8-hour standard is <u>not</u> presently being exceeded in the area over Geneva Steel. Both of these areas will be reduced below current levels and will be within the standard by 1995.

At present, TSP primary standards are exceeded in the basin. The concentrations are expected to decrease only slightly but would then fall below the annual primary standard by 1995. However, the 24-hour TSP standard may still be violated in 1995. The TSP levels will still violate the secondary standard over northwestern Provo in 1995.

SECTION 11 - ECONOMIC CONSIDERATIONS

The economic effect of any project is naturally of interest to everyone. If the wastewater treatment project that was recommended is put into operation it will account for $78 million in capital investments over a 20 year period. Of this amount, $31 million will be paid in salaries to people working on the project over the same time period. New jobs that will be created by the project will number about 100 for construction and about 200 for related services. These numbers of new job openings will not significantly change the overall job outlook for construction and related services in the study area. The alternatives recommended under the Plan are neither the most expensive nor the least expensive. The money figures for all of the different alternatives are detailed in the complete Environmental Impact Statement.

With the conversion of land from agricultural use to urban use over the next 20 years there will be a decrease in the total amount of agricultural goods produced in the area. The amount of this loss will increase each year as more and more land is taken out of agricultural production until such loss reaches its largest figure in 1995 which is estimated to be $6.5 million. This loss could be offset by other markets that will result from the urban use of this land.

Except for Central Utah and Davis Counties, all of the counties in the study area were estimated to have enough bonding capacity in 1973 to finance the Plan's recommended alternative without Federal funds. With 75 percent of the construction cost paid by EPA, all of the counties have sufficient bonding capacity to finance the project even without allowing for the likely increase in bonding capacity that has occurred since 1973 and will occur as population in the area increases. However, individual cities may experiences more or less of a financial impact than indicated for each county as a whole when constructing a treatment plant because of local funding situations.

SECTION 12 - WATER RIGHT CONSIDERATIONS

A significant problem associated with the implementation of any regional wastewater treatment alternative in the study area is the impact on existing water rights. Existing water law in the study area can be summed up in the following:

- Utah water law is founded on the Colorado Doctrine of prior appropriation; i.e., "First in time - first in right".
- Water law in Utah is an adjudicatory process rather than a statuatory process. Thus, the fundamentals of prior appropriation are derived from legal actions, not from legislative actions.
- Water rights in the study area are highly complex and not clearly defineable.

Given these fundamentals, it is difficult to assess the nature of water rights problems which could develop from implementation of any wastewater treatment alternative. This can be accomplished only through judicial processes. In general, the alternative configurations which could create water rights issues involve a downstream appropriator's right being adversely affected by consolidation of facilities, land application of effluent, or changes in point of discharge upstream. If such an impact does occur, the appropriate authority may choose to enter into litigation to carry on with the proposed project or to purchase or substitute the appropriator's water right.

SECTION 13 - MITIGATION OF IMPACTS

Mitigating measures are those actions which can be taken in conjunction with implementation of any wastewater treatment alternatives or as a separate action to reduce or compensate for adverse environmental impacts associated with plan implementation. A summary of possible mitigation measures, associated with the most important environmental impacts, is given below.

The large contribution of non-point sources to specific water quality problems and the high cost of constructing advanced wastewater treatment plants makes the selection of the most appropriate mix of point and non-point source controls a very significant water quality consideration. Currently the 208 Areawide Waste Treatment Management Planning Agencies, which cover the study area, are developing plans to assess the extent of non-point pollution sources and will recommend measures for their control. Their plans will be based on a non-point source monitoring and evaluation program which will identify and quantify the character of non-point pollution contributing to water quality problems in the Utah Lake and Jordan River Basins. These 208 plans will recommend measures which are economically, institutionally, and environmentally acceptable for the control of non-point pollution sources.

The Plan represents a commitment of wastewater treatment facilities which will accommodate nearly a doubling of the area's population by the year 1995. This increase in population and the associated development may present additional problems to EPA's and Utah's goals for attainment and maintenance of air quality standards along the Wasatch Front. As exhibited in this environmental statement, the attainment and maintenance of carbon monoxide standards will not be a problem in the long run; however, CO standards may continue to be exceeded over the next few years and possibly through 1985 in Salt Lake City. Without further controls placed upon significant point sources of particulates, violation of ambient particulate standards will continue. Even with greater control of point sources, increased growth and development, along with fugitive sources of particulates, could prevent the attainment and/or maintenance of the primary particulate standards.

In order to improve air quality conditions along the Wasatch Front, EPA will continue to work with the State of Utah and local governments to support and enforce the provisions called for in the State Implementation Plan (SIP). Measures called for by Utah's SIP (inspection/maintenance and retrofit) which were not accounted for in the CO predictions contained in this environmental statement should provide for earlier

attainment of CO standards than predicted. Attainment and maintenance of particulate standards will require continued control, and in some cases, further reductions in point sources of particulates than presently required by Utah's SIP. Control of other sources of particulates, not now considered in the SIP, may also be required.

The future location of wastewater treatment plants and the location of interceptor sewer lines along with their design capacity will provide further opportunities for suburban development. This development will largely be at the expense of presently agricultural and vacant lands. Sensitive environmental areas such as floodplains, marshland, wildlife habitat, steep slopes, and unstable soils may also be adversely affected. Without the necessary regulation by local and County jurisdictions, such development may not be consistent with the land use goals of County and City Master Plans in the area.

EPA believes that the primary responsibility for regulating land use and development patterns is that of local governmental jurisdictions. If the potential adverse impacts associated with urban sprawl, conversion of agricultural uses to other uses, and the degradation of unique, environmentally sensitive land areas are to be controlled, it will by necessity, be these local governments that do so. Land use management including zoning, tax incentives, sewer use ordinances, tap fees, etc., represent some of the possible measures which can be taken by local governments to minimize undesirable development patterns resulting from plan implementation.

At this time, EPA has no information to suggest that implementation of the Plan will result in adverse impacts to archaeological or historical sites, or to threatened or endangered wildlife species. If such information is obtained, the appropriate coordination and action will be taken.

See Chapter IX of the draft EIS for a more extensive list of potential mitigation measures.

SECTION 14 - ALTERNATIVE COURSES OF ACTION

The Utah Lake-Jordan River Water Quality Management Plan recommends expansion of wastewater treatment facilities through regionalization along with upgrading treatment efficiencies to meet Utah's Level III effluent requirements. The water quality regulations of Utah establish effluent requirements of Level III treatment prior to discharge of domestic wastewater by July, 1980. These 1980 effluent requirements provide for a high degree of removal of BOD, suspended solids and coliform bacteria. (See Table on page 12). The State of Utah considers these effluent requirements necessary to reduce, to an acceptable level, the health hazard associated with wastewater effluents as well as to achieve in-stream water quality standards. As permitted under Section 510 of the Federal Water Pollution Control Act, the State of Utah has established these Level III effluent requirements which are more stringent than those called for under the timetables in the Federal Act.

EPA's secondary treatment effluent limitations, shown on page 12, are presently required to be met by all domestic wastewater discharges by July, 1977. In accordance with the Federal Water Pollution Control Act, EPA has determined that these National secondary treatment requirements are adequate for treatment of domestic wastewater, if water quality standards are not violated by the effluent discharged. Where necessary to attain water quality standards or where shown to be cost-effective, EPA supports the use of more advanced treatment levels resulting in a higher quality effluent.

The relationship between point and non-point pollution sources in determining in-stream water quality may create situations where advanced treatment levels such as Utah's Level III requirements are not needed immediately. Within the Study Area both point and non-point pollution sources cause violations of Utah's in-stream water quality standards. The Plan recommends controls for domestic wastewater point sources by specifying Level III effluent requirements throughout the study area. However, without the addition of non-point source controls, it is probable that in-stream water quality standards will not be achieved in some instances.

The three 208 Areawide Waste Treatment Management Planning Agencies which cover the Utah Lake and Jordan River Study Area will be recommending methods for control of non-point pollution sources. In areas where non-point pollution is the significant source, an evaluation of the degree of non-point vs. point controls can best be made by these on-going 208 programs. In determining funding priorities over

the next few years, it would appear to be advisable to analyze the costs and water quality benefits of various treatment levels and non-point source controls to determine the most cost-effective approach to meeting in-stream water quality standards in that area.

While EPA recognizes Utah's requirement of Level III treatment by July, 1980, Federal funds to aid in the construction of wastewater treatment facilities to meet this deadline are limited. Presently, EPA does not have sufficient funds to provide 75 percent Federal funding of the estimated capital construction costs for providing Level III treatment for all proposed wastewater treatment facilities in the Utah Lake and Jordan River Basins. It is therefore necessary to determine the best possible way in which to utilize these limited Federal funds over the next few years to protect public health and to attain in-stream water quality standards.

The procedure required by the Federal Water Pollution Control Act for determining the best way to spend these Federal funds is the development of a funding priority list which is adopted every year by the State of Utah. Projects which are eligible for Federal funding are evaluated in accordance with specified policies and are then assigned a priority for receiving Federal funds. Projects with a high priority are the first to receive Federal funds. The policies used to evaluate and compare competing projects are very important in determining which projects receive funding priority.

EPA feels that there are alternative policies which should be considered in determining funding priorities for wastewater treatment projects in the Utah Lake and Jordan River Basins. EPA has identified two basic alternative policies which are discussed below. EPA encourages reviewers to comment upon the merits of the two policies and to suggest options which they may prefer.

The two basic alternative policies which EPA has identified regarding implementation of the Utah Lake-Jordan River Water Quality Management Plan are:

1) EPA can approve the Plan as recommended with Level III being the minimum treatment efficiency acceptable at all locations by 1980. The Plan would be implemented in accordance with the State's priority list as Federal funds become available. This option would provide Federal funds to upgrade treatment plants to the Level III treatment, considered necessary by the State of Utah to protect public health. However, since Federal funds are limited, some municipalities and sanitation districts would either have to absorb the additional cost of providing this Level III treatment to

protect public health or delay upgrading treatment plants until Federal funds become available. Where secondary treatment is not now being achieved by a wastewater treatment plant, a delay in upgrading the treatment level may conflict with the Federal requirement of achieving secondary treatment by July, 1977.

2) EPA can conditionally approve the Plan whereby implementation occurs in accordance with the following general priorities. First funding priority is given to upgrading treatment plants to secondary treatment or to advanced levels of treatment (Level III, etc.) where necessary to attain in-stream water quality standards or where advanced treatment is found to be the most cost-effective wastewater treatment alternative. Second funding priority would be given to providing advanced treatment where an improvement in water quality is demonstrated in conjunction with control of non-point pollution sources. Third priority for funding advanced treatment would be given to those situations which do not fit the first two priority classes. This option would spread the limited Federal funds among more projects on a priority basis, by first providing funds for Level III treatment only where such treatment is needed to attain in-stream water quality standards or where Level III treatment is shown to be the most cost-effective alternative. However, this option might require some municipalities and sanitation districts to upgrade treatment plants to secondary treatment now, and in a few years upgrade to Level III.

A decision on these alternative courses of action will be made in the final environmental impact statement after considering all comments received on the draft statement.

GLOSSARY OF ABBREVIATIONS

BOD	-	Biochemical Oxygen Demand
CO	-	Carbon Monoxide
mg/l	-	milligrams per liter
MPN/100 ml	-	Most probable number of organisms per 100 milliliters
NO_3	-	Nitrates
ppm	-	parts per million
PO_4	-	Phosphates
SIP	-	Utah State Implementation Plan for attainment of national ambient air quality standards.
TDS	-	Total Dissolved Solids
TN	-	Total Nitrogen
TSP	-	Total Suspended Particulates
TSS	-	Total Suspended Solids
ug/m^3	-	micrograms per cubic meter

GLOSSARY OF TERMS

ALGAE are plants which grow in sunlit waters. They are a food for fish and small aquatic animals, and like all plants, put oxygen in the water.

BACTERIA are small living organisms which often consume the organic constituents of sewage.

BOD, or biochemical oxygen demand, is the dissolved oxygen required by organisms for the aerobic decomposition of organic matter present in water. It is used as a measure in determining the efficiency of a sewage treatment plant.

CHLORINATOR is a device for adding chlorine gas to sewage to kill infectious germs.

EFFLUENT is the liquid that comes out of a treatment plant after completion of the treatment process.

INTERCEPTOR sewers in a combined system control the flow of the sewage to the treatment plant. In a storm, they allow some of the sewage to flow directly into a receiving stream. This protects the treatment plant from being overloaded in case of a sudden surge of water into the sewers. Interceptors are also used in separate sanitation systems to collect the flows from main and trunk sewers and carry them to the points of treatment.

ORGANIC MATTER is the carbonaceous waste contained in plant or animal matter and originating from domestic or industrial sources.

OXIDATION is the addition of oxygen which breaks down organic wastes or chemicals in sewage by bacterial and chemical means.

PRIMARY TREATMENT removes the material that floats or will settle in sewage. It is accomplished by using screens to catch the floating objects and tanks for the heavy matter to settle in.

POLLUTION results when animal, vegetable, mineral, or heat wastes or discharges reach water, making it less desirable for domestic, recreation, industry, or wildlife uses.

RECEIVING WATERS are rivers, lakes, oceans, or other water courses that receive treated or untreated waste waters.

SECONDARY TREATMENT is the second step in most waste treatment systems in which bacteria consume the organic parts of the wastes. It is accomplished by bringing the sewage and bacteria together in trickling filters or in the activated sludge process.

SUSPENDED SOLIDS are the small particles of solid pollutants which are present in sewage and which resist separation from the water by conventional means.

WASTE TREATMENT PLANT is a series of tanks, screens, filters, and other processes by which pollutants are removed from water.

* U.S. Government Printing Office: 1976-677-069